WASHINGTON
SCIENCE TRENDS

HIGHLIGHTS

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* ADMINISTRATION PLANS NEW TECHNICAL SPENDING

President Kennedy is now sending to Congress the series of recommendations for increased technical spending which have been under study for the past two months. Primary emphasis is on additional funds for limited war equipment, and for research.

✓ The President, meanwhile, makes this new policy declaration:

"These increases reflect my strong belief that advances in scientific research are of the utmost importance to the growth of our economy, the welfare of our people, to the preeminence of our scientific achievements, and my conviction that the federal government, must of necessity, play a sizable role supporting such research."

✓ Major Programs -- Specifically mentioned by Mr. Kennedy are oceanography, high energy physics, saline water conversion, medical research and grants. In the National Science Foundation budget support of basic research goes from $75.6 to $94.5 million; support of basic research facilities from $35 to $62.9 million; for national research centers from $7.1 to $8.6 million; science education from $71.3 to $90 million. Further details were not immediately available.

✓ NASA Spending -- The President estimates that spending for the Fiscal Year which begins July 1, 1961 will reach approximately $85 million more than the $990 million planned by Mr. Eisenhower for the National Aeronautics and Space Administration. Although details were not immediately available, the additional funds are expected to be used for solid propellant rocket technology, for advanced man-in-space programs and for work by Pratt and Whitney on the liquid oxygen/liquid hydrogen Centaur engine, which has encountered technical difficulties. First Centaur launch has now been delayed from mid-1961 to the last quarter of 1961.

✓ Defense Spending -- Alterations in the planned Defense program have been undergoing changes almost daily for the past few weeks. A Defense budget revision to be submitted to Congress early in the week of March 27 reportedly calls for additional Polaris and Minuteman missile funds, a speed-up in the program for a new tactical support fighter aircraft, as well as research on advanced tactical communications/control/reconnaissance equipment.

✓ Aircraft Nuclear Propulsion -- Congressional sources believe that the Administration will agree to a continuation of the "two approach" program for aircraft nuclear propulsion. The original Eisenhower Administration budget contemplated dropping the General Electric Company direct cycle program while continuing R&D on the Pratt and Whitney indirect cycle. Sources indicate that the Administration now believes that a decision between the two cannot be made for another year or more.

SALINE WATER CONVERSION: The House Committee on Science and Astronautics has just issued an excellent new review of this complex program. 222 Pages. Single Copies are free upon request. Write Rep. Overton Brooks, Chairman, New House Office Building, Washington 25, D. C. for "Research Needs for Salt Water Conversion."

TECHNICAL TRENDS

- The U. S. Navy expects to issue bid invitations next month for 3 PC Type submarine chasers and for design, development and construction of a 15-ton displacement, high speed hydrofoil test craft. Complete details are available from BuShips, Department of the Navy, Washington 25, D. C. Mark inquiries regarding submarine chaser Attn: Code 526, for Hydrofoil, Attn: Code 420. √√√ The Maritime Administration is asking for bids on two hydrographic surveying ships for the Coast and Geodetic Survey, with an option to construct a third. √√√ A list of 99 life science research contracts awarded during November and December, 1960 is now available in Announcement IN 181 from Information Office, U. S. Atomic Energy Commission, Washington 25, D. C. √√√ The Federal Communications Commission, Attn: Press Information Office, Washington 25, D. C. has available Public Notice G-1627 outlining the FCC's relation to the problems of space communications.

- The Department of Interior has begun contract negotiations with four of fourteen firms which have expressed interest in entering the helium production business. There is no cut-off date for industrial proposals, and further information can be obtained from the Office of Assistant Director, Helium, Bureau of Mines, Room 4627, Interior Building, Washington, D. C. or Office of the General Manager, Helium Operations, Bureau of Mines, 514 Barfield Bldg., Amarillo, Tex. √√√ The FCC is looking for an organization interested in a contract for measuring VHF and UHF television signals with hand-carried equipment at 5,000 locations in the New York City area. Details are available from Chief, Administrative Services Division, FCC, Washington 25, D. C. √√√ A review of lunar photography problems and progress by R. J. Hackman, U. S. Geological Survey, is available in Release 90097-61, March 22, 1961 from Information Office, U. S. Department of the Interior, Washington 25, D. C.

- The Directorate of Procurement, AFFTC, Edwards Air Force Base, Calif. has issued a call for "complete information" on capabilities for firms having research and development experience in the field of liquid and solid propellant rocket motor, design, fabrication or development. √√√ The Aeronautical Systems Center, Wright Patterson Air Force Base, Ohio has set a March 30 deadline for firms interested in a nonvacuum electron beam welding project. Details are available at the Center, ATTN: LMPMGC.

- The Navy expects to equip its deep-diving bathyscaph Trieste with a mechanical arm that can reach out and pick up materials from the ocean floor. The manipulator, being built by General Mills Nuclear Equipment Department, Minneapolis, will be equipped with oil-filled units to equalize pressure on motors other critical parts. √√√ The Air Force is sponsoring the first advanced course in reliability engineering at Case Institute of Technology, Cleveland, Ohio. √√√ Project Focus of the Advanced Research Projects Agency, The Pentagon, Washington 25, D. C. is designed to provide modern equipment for universities participating in the long established, tri-service electronics research program.

ROYALTY-FREE PATENT

The following invention, developed at U. S. Government expense, is now available to U. S. Industry, royalty-free. For Patent Number, and details on licensing subscribers may write Service Department, Washington SCIENCE TRENDS, National Press Building, Washington 4, D. C.

- Bonding Silicone Rubber to Metal -- Silicone rubber may be bonded to copper, brass, bronze, magnesium, steel and other metals. The rubber and metal are united by an epoxy resin adhesive containing an amine curing catalyst and a filler such as clay or mica. The assembly is subjected to heat to effect curing of the resin.

* POST OFFICE RESEARCH AND DEVELOPMENT

Cancellation of the Post Office Department's facsimile "speed mail" program, and major changes in the automated "Project Turnkey" Post Office, are two of the more important alterations in the Department's R&D budget.

Contrary to other reports, however, the Department intends to continue much of its R&D program. J. Edward Day, the new Postmaster General, has advised Congress that "in an operation of this size and complexity, a research program is necessary and appropriate (and) should be a continuing one." Actual research amounts to $12 million, or one third of 1 percent of the total budget.

Some of the 1962 program, as originally planned:

✓ Culling Machine Improvement, $250,000 -- To increase efficiency and reliability and reduce size and production costs. Initial work is underway to develop a device to link the culler and the Department's facer-canceler. The prototype linking device is to remove objects and envelopes containing metal, and to feed two facer-canceler units. The device will contain an accumulator for receiving and temporarily storing letters which are excess to the capacity of the facer-cancelers, and will also contain feedback circuitry to modulate the speed of the culling machine.

✓ Facer-Canceler Improvements, $250,000 -- A reliable machine method for detection of stamp location is desired. Present machines use a light-sensing technique, and are not accurate enough. Possible improvement may come from phosphorescent, magnetic, isotopic, luminescent and photocromic techniques. Improvements would also allow varying postage demoniations and priority mail to be automatically separated for appropriate handling.

✓ Automatic Reading, $800,000 -- A prototype machine is expected to be constructed which will be used to sort specially selected mail, such as that from a large mail order house. A three-year program is planned to continue development of equipment which will have the capacity to read and sort to street addresses and certain large mail recipients. By Fiscal 1962, it is expected, a machine will be available which can read and sort mail with printed or typed addresses to 50 separations (cities and/or states), and read zone numbers within the bottom line of an address.

✓ Improvement of Letter Sorting Equipment, $650,000

✓ Bundle Sorting, $200,000

✓ Automatic Weight-Count Equipment, $300,000 -- Further development of experimental equipment which automatically weighs trays of letter mail and converts the weight into a piece count, based on a predetermined weight-piece ratio. Improved controls, printout and monitoring consoles are included.

✓ Parcel Post Handling Equipment, $1,150,000 -- To improve parcel sorting; improve conveyor components and systems and to develop a series of containers for bulk handling of mail.

✓ Closed Circuit TV, $575,000 -- for surveillance of postal employees. Equipment already installed on an experimental basis is said to show "much promise." Additional work is required to reduce camera enclosure size and optical methods, including such techniques as the use of fiber optics; to improve control systems for multicamera installations; determine proper light levels for optimum picture clarity including possible infrared techniques. Commercially available equipment will be used or modified whenever possible.

✓ Calculating Money Order Issuing Machine, A print-punch money order machine is already being procured for all money order stations. A calculating model would be used at about 500 high volume post offices.

RESEARCH CHECKLIST

□ X-RAY BARRIERS: Studies for the Atomic Energy Commission indicate that present requirements for x-ray barrier walls may often be excessive -- a finding that may lead to impressive savings in the cost of future x-ray installations. Experiments showed that the amount of lead shielding required to reduce radiation exposure to a desired level is often more than is necessary.

(For further information, write National Bureau of Standards, Office of Technical Information, Washington 25, D. C. regarding "X-Ray Barrier Determinations")

□ DETECTING CESIUM AND RUBIDIUM: The U. S. Bureau of Mines has developed a simple new field test said to be capable of detecting cesium and rubidium in quantities as low as 60 parts per million in rocks, clays and mineral waters. Only a few chemicals and inexpensive equipment is said to be required. The two elements are used in minute quantities in infrared devices such as lamps, telescopes and spectrometers; in photoelectric cells; electronic vacuum tubes and scintillation counters. Larger quantities are used in certain medicines and ceramics. Prospective new uses include ion-propulsion fuels, plasma in thermionic converters and heat-transfer media in nuclear power systems.

(Details are now available in U. S. Bureau of Mines Report of Investigation No. 5675 at 15 cents from Superintendent of Documents, Government Printing Office, Washington 25, D. C.)

□ TRANSISTORIZED PULSE COUNTING EQUIPMENT: Research at Oak Ridge National Laboratory has resulted in development of an hermetically sealed, completely transistorized, pulse counting system which can operate in corrosive environmental conditions. The device is designed to indicate excess amounts of radiation, but other possible uses are said to include tachometers, flowmeters, and many types of frequency measuring devices.

(Details are available in Report Y-1313, available through Atomic Energy Commission channels or at 75 cents from OTS, U. S. Department of Commerce, Washington 25, D. C.)

□ RADIO TRANSMISSION FROM LIFTING REENTRY VEHICLES: Estimates made by the National Aeronautics and Space Administration indicate that antennas should be located on the rear of lifting reentry vehicles and that frequencies on the order of 10 kmc should be used to transmit downward and forward from the vehicle. The very high frequency is required to penetrate the sheath of ionized atmospheric gas or plasma which will envelope the vehicle during the high temperature portions of reentry. The thickest and most energetic portion of the plasma sheath will be located on the bottom and front of the vehicle and transmission to the ground ahead of the vehicle will have to be made through this portion.

(NASA Report TN D-507, "Radio Transmission Through the Plasma Sheath Around a Lifting Reentry Vehicle" available from NASA, ATTN: CODE BID, 1520 H Street, N. W., Washington 25, D. C.)

(Continued)

□ LOW-COST HIGH VELOCITY ELECTRIC ACCELERATORS: Complete study of high velocity particle accelerator systems for impact resistance studies has been made by Bolt, Beranek and Newman Inc. for the Air Force. Several types of light gas guns and electric accelerators were covered in detail with conclusion that the most attractive, lowest cost accelerator system, within the present state-of-the-art, was a lithium charged light gas gun actuated by a large condenser bank.

(Complete report of this study contained in WADD Technical Report 60-468 (PB 171 138) available through military channels or at $2.75 from OTS, U. S. Department of Commerce, Washington 25, D. C.)

□ HIGH TEMPERATURE OXIDATION COATING FOR GRAPHITE: Thin coating of titanium nitride has effectively protected graphite slabs from oxidation and deteriation in a Mach 2 air-stream with a stagnation temperature of 2,250° K during tests conducted by the National Aeronautics and Space Administration. Unprotected graphite would be severely damaged after 20 seconds in these flow conditions and would be destroyed within a minute. The protective mechanism appears to be similar to that of aluminum at room temperature. The surface of the vapor-deposited titanium nitride combines with the atmosphere to form a protective oxide coating.

(Complete test results and a theoretical discussion of the conditions necessary for the use of oxidizable substances for use as oxidation-protective coatings in high temperature air are contained in NASA Technical Note D-722 available from NASA, ATTN: CODE BID, 1520 H Street, N. W., Washington 25, D. C.)

□ ARMY TESTING GAS TURBINE TRACTOR: Army Engineers are testing a gas turbine powered tractor in which a 600 pound engine replaces a 5,000 pound Diesel. The GMT-305 turbine, developed by General Motors Corp., has been placed in a standard rubber-tired tractor modified to accomodate the new powerplant. The tractor is said to be one of the first military applications of turbine-powered earthmoving and construction equipment.

(Tests reported by Technical Liaison Office, U. S. Army Engineer Research and Development Laboratories, Ft. Belvoir, Va.)

□ THERMAL ANALYSIS OF SPACE SUITS IN ORBIT: Elementary study of a model space suit in orbit has shown the feasibility of using passive suit-temperature controls for astronauts on the outside of vehicles whether they are shaded from the sun or directly exposed to its rays. The general computer program organized during this study by the Aeronautical Research Laboratory of the Wright Air Development Division has been retained so that future, more sophisticated calculations regarding this problem may be made with a minimum of difficulty.

(WADD Technical Note 60-145 (PB 171 143) available through military channels or for $.75 from OTS, U. S. Department of Commerce, Washington 25, D. C.)

□ STANDARD FILTER/SEPARATORS: The Army is developing a "family" of filter/separators in standard 50,300 and 600 gallon per minute sizes for decontaminating hydrocarbon fuels used in aircraft and vehicles. Officials state that although commercial units may be modified to meet military requirements such equipment varies considerably in configuration and dimensional details--preventing interchange of removal media of any one manufacturer within the vessel of another. Type classification of standard designs now being developed is anticipated during Fiscal Year 1963.

(R&D by U. S. Army Engineer Research and Development Laboratories, Ft. Belvoir, Va. in conjunction with Armour Research Foundation, Chicago, Ill.)

PUBLICATION CHECKLIST

- PRODUCING HEAVY FUEL OIL FROM COAL, a detailed report of U. S. Bureau of Mines efforts directed toward a low-pressure process for converting coal to heavy fuel oil. 56 Pages. Single Copies Free. (Write U. S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa. for Report of Investigation No. 5674)

- STANFORD ACCELERATOR PROJECT, an admirable collection of background material on high energy physics and a large linear accelerator proposed for construction at Stanford University, California. 445 Pages. Single Copies Free. (Write Joint Committee on Atomic Energy, F-88, The Capitol, Washington 25, D. C. for "Background Information on the High Energy Physics Program.")

- ELECTRONIC SURVEYING, a report on developments in this field during 1960, with particular emphasis on such instruments as the Geodimeter and Tellurometer. 31 Pages. 80 Cents. (Write Publications Office, Highway Research Board, National Academy of Sciences, Washington 25, D. C. for HRB Bulletin No. 258)

- NIGHT VISIBILITY, a collection of 1960 research papers on such topics as highway illumination, windshield glass, and various phases of lighting research. 195 Pages. $4. (Write Publications Office, Highway Research Board, National Academy of Sciences, Washington 25, D. C. for HRB Bulletin No. 255)

- RADIOISOTOPES IN WORLD INDUSTRY, an abstract-bibliography of selected foreign literature reporting current progress in the industrial use of isotopes. Covers 1958-1959, with supplements now under preparation. 141 Pages. $2.50. (Available as TID-6613 through AEC channels or at $2.50 from OTS, U. S. Department of Commerce, Washington 25, D. C.)

- DESIGN CRITERIA FOR PRINTED CIRCUIT BOARDS, an excellent step-by-step report which sets forth the principles of good printed wiring board design practice proven by test results and practical experience "to yield the simplest and most reliable product at minimum cost." Can be recommended to anyone in the design or manufacturing phases. Prepared by Sandia Corp. for the AEC. 62 Pages. (Available as SCDR 280-60 through AEC channels or at $1.75 from OTS, U. S. Department of Commerce, Washington 25, D. C.)

- SUPERALLOY FORGINGS, a review of several newer forgeable nickel-base, iron base and cobalt-base alloys that have useful service temperatures in the range of 1200 to 1800° F, particularly for aircraft and spacecraft application. 39 Pages. (Available at no cost to Government Agencies, contractors, subcontractors and their suppliers. (Write Defense Metals Information Center, Columbus 1, Ohio regarding DMIC Memorandum No. 86)

- DOCUMENTATION, INDEXING AND RETRIEVAL OF SCIENTIFIC INFORMATION, a supplement to a highly popular survey published last year as Senate Document 113. This pamphlet includes new information on progress by the Armed Forces Supply Center, Bureau of Ships and NASA. 22 Pages. (Senate Document 113 and Addendum available, in limited supplies, from the Chairman, Subcommittee on Reorganization, Committee on Government Operations, U. S. Senate, Washington 25, D. C.)

- SCOUT PROGRAM, a comprehensive new report on considerations affecting satellite and space probe research with emphasis on the "Scout" as a launch vehicle. Covers payload design and packaging, environmental tests, launch facilities, tracking and telemetry requirements, data acquisition, processing and analysis. 146 Pages. (Available in the near future as NASA Technical Report R-97 from NASA, ATTN: CODE BID, 1520 H Street, N. W., Washington 25, D. C.)